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the hardness of a mattress, by moving the handle of the air-pump, which is placed commodiously within reach; or they may be rendered soft to any required degree, by the exhausting-pump also within reach.

5. They may at any time be rendered perfectly fresh and cool, by merely changing the air by the alternate use of the air-pump; this may be effected in a few minutes, without the person sleeping on the beds being moved, hence their great advantage to invalids, and their generally refreshing and salubrious effects.

To the colonies and plantations in the West Indies, or where warmth of climate prevails, they present numerous advantages from the facility with which they are rendered cool, or to the coldest climates from their warmth, air being one of the best non-conductors of heat.

The air-pumps, together with all the machinery for filling and exhausting the beds, being inclosed under the bedsteads, and communicating with cords and tassels (resembling bell-pulls,) suspended immediately above the pillows, any alteration in the state or temperature of the beds, is thus easily effected, and at any time required.

4. On the general principle of fluids maintaining a uniform level, they are not subject to be sloping on one side; nor are they subject to those hard clumps or knots which feathers or down gradually acquire in the course of a few years, and thereby occasion the troublesome process of taking out the feathers, and fresh making them up.

5. The impossibility of their ever getting damp, the internal case being impermeable to moisture.

6. They require no making up, as, by their elasticity they rise immediately when left, and are then in the state of other beds after being shaken and made up; the counter-pane, &c. being returned as usual. Hence they occasion no dust or filth in the rooms or on the furniture, which is always the case where feather down beds are used.

7. Their extreme lightness, the largest weighing only a few ounces.

8. Their portability, being easily folded or rolled up, after being previously exhausted; hence their great advantage to travellers.

9. For medical purposes they may be filled with air at any required temperature, or with water, steam, or other fluids, ei-

ther wet or dry, elastic or non-elastic; to which the case is equally impermeable.

Seamen's hammocks will be light, portable and bouyant, and in case of shipwreck, could be used as life-preservers.

Cushions, pads, and carriage-linings will be eligible and commodious from their lightness and elasticity.

Printers' balls for beating the types are commonly made of leather, and stuffed with wool, which soon becomes saturated with moisture from the ink, which makes them inconveniently heavy; but on the present construction they will be light, and may be rendered elastic to any required degree, by means of a tube in the handle, furnished with an air tight stop-cork, &c., as before described.

Observations on the method of producing new and early fruit; by Thomas Andrew Knight, Esq. F.R.S. &c.

(From the Transactions of the Horticultural Society of London.)

Nature has given to man the means of acquiring those things which constitute the comforts and luxuries of civilized life, though not the things themselves; it has placed the raw material within his reach; but has left the preparation and improvement of it to his own skill and industry. Every plant and animal, adapted to his service, is made susceptible of endless changes, and, as far as relates to his use, of almost endless improvement. Variation is the constant attendant on cultivation, both in the animal and vegetable world; and in each the offspring are constantly seen, in a greater or less degree, to inherit the character of the parents from which they spring.

No experienced gardener can be ignorant that every species of fruit acquires its greatest state of perfection in some peculiar soils and situations, and under some similar mode of culture; the selection of a proper soil and situation must therefore be the first object of the improver's pursuit; and nothing should be neglected which can add to the size, or improve the flavour of the fruit from which it is intended to propagate. Due attention to these points will in almost all cases be found to comprehend all that is necessary to insure the introduction of new varieties

of fruit, of equal merit with those from which they spring; but the improver, who has to adapt his productions to the cold and unsteady climate of Britain, has still many difficulties to contend with; he has to combine hardiness, energy of character, and early maturity, with the improvements of high cultivation. Nature has, however, in some measure, pointed out the path he is to pursue; and, if it be followed with patience and industry, no obstacles will be found which may not be either removed or passed over.

If two plants of the Vine, or other tree, of similar habits, or even if obtained from cuttings of the same tree, were placed to vegetate, during several successive seasons, in very different climates; if the one were planted on the banks of the Rhine, and the other on those of the Nile, each would adapt its habits to the climate in which it were placed; and if both were subsequently brought, in early spring, into a climate similar to that of Italy, the plant which had adapted its habits to the cold climate would instantly vegetate, whilst the other would remain perfectly torpid. Precisely the same thing occurs in the hot-houses of this country, where a plant accustomed to the temperature of the open air will vegetate strongly in December, whilst another plant of the same species, and sprung from a cutting of the same original stock, but habituated to the temperature of a stove, remains apparently lifeless. It appears, therefore, that the powers of vegetable life, in plants habituated to cold climates, are more easily brought into action, than in those of hot climates: or, in other words, that the plants of cold climates are most excitable: and as every quality in plants become hereditary, when the causes which first gave existence to those qualities continue to operate, it follows, that their seedling offspring have a constant tendency to adapt their habits to any climate in which art or accident places them.

But the influence of climate on the habits of plants, will depend less on the aggregate quantity of heat in each climate, than on the distribution of it in the different seasons of the year. The aggregate temperature of England, and of those parts of the Russian Empire, that are under the same parallels of latitude, probably does not differ very considerably; but, in the latter, the summers are extremely hot, and the winters intensely cold; and the changes of temperature be-

tween the different seasons are sudden and violent. In the spring, great degrees of heat suddenly operate on plants which have been long exposed to intense cold, and in which excitability has accumulated during a long period of almost total inaction; and the progress of vegetation is in consequence extremely rapid. In the climate of England, the spring, on the contrary, advances with slow and irregular steps, and only very moderate and slowly-increasing degrees of heat act on plants in which the powers of life have scarcely in any period of the preceding winter been totally inactive. The Crab is a native of both countries, and has adapted alike its habits to both: the Siberian variety introduced into the climate of England retains its habits, expands its leaves, blossoms on the first approach of spring, and vegetates strongly in the same temperature in which the native Crab scarcely shows signs of life; and its fruit acquires a degree of maturity, even in the early part of an unfavourable season, which our native Crab is rarely or never seen to attain.

Similar causes are productive of similar effects on the habits of cultivated annual plants: but these appear most readily to acquire habits of maturity in warm climates; for it is in the power of the cultivator to commit his seeds to the earth at any season; and the progress of the plants towards maturity will be most rapid where the climate and soil are most warm. Thus the barley grown on sandy soils, in the warmest parts of England, is always found by the Scotch farmer, when introduced into his country, to ripen on his cold hills earlier than his crops of the same kind do when he uses the seeds of plants which have passed through several successive generations in his colder climate; and, in my own experience, I have found that the crops of wheat on some very high and cold ground, which I cultivate, ripen much earlier when I obtain my seed-corn from a very warm district and gravelly soil, which lies a few miles distant, than when I employ the seeds of the vicinity.

The value, to the gardener, of an early crop, has attracted his attention to the propagation and culture of the earliest varieties of many species of our esculent plants; but in the improvement of these he is more often indebted to accident than to any plan of systematic culture; and contents himself with merely selecting and propagating from the plant of the earliest

habits, which accident throws in his way, without inquiring from what causes those habits have arisen; and few efforts have been made to bring into existence better varieties of those fruits which are not generally propagated from seeds, and which, when so propagated, of necessity exercise, during many years, the patience of the cultivator, before he can hope to see the fruits of his labour.

The attempts which I have made to produce early varieties of fruit are, I believe, all that have yet been made; and though the result of them is by no means sufficiently decisive to prove the truth of the hypothesis I am endeavouring to establish, or the eligibility of the practice I have adopted, it is amply sufficient to encourage future experiment.

The first species of fruit which was subjected to experiment by me was the apple; some young trees of those varieties of this fruit, from which I wished to propagate, were trained to a south wall, till they produced buds which contained blossoms. Their branches were then, in the succeeding winter, detached from the wall, and removed to as great a distance from it as the pliability of their stems would permit; and in this situation they remained till their blossoms were so far advanced in the succeeding spring as to be in some danger of injury from frost. The branches were then trained to the wall, where every blossom I suffered to remain soon expanded, and produced fruit. This attained in a few months the most perfect state of maturity; and the seeds afforded plants which have ripened the fruit very considerably earlier than other trees, which I raised at the same time from seeds of the same fruit, which had grown in the orchard. In this experiment the fecundation of the blossoms of each variety was produced by the farina of another kind; from which process I think I obtained in this, and many similar experiments, an increased vigour and luxuriance of growth, but I have no reasons whatever to think that plants thus generated ripen their fruit earlier than others which are obtained by the common methods of culture. I must, therefore, attribute the early maturity of those I have described to the other peculiar circumstance, under which the fruit and seeds ripened from which they sprang.

I obtained by the same mode of culture many new varieties, which are the offspring of the Siberian Crab, and the richest of our apples, with the intention of

affording fruits for the press, which might ripen well in cold and exposed situations. The plants thus produced seem perfectly well calculated, in every respect to answer the object of the experiment, and possesses an extraordinary hardness and luxuriance of growth. The annual shoots of some of them, from newly grafted trees in my nursery, the soil of which is by no means rich, exceeded six feet and a half in height the last season, and their blossoms seem capable of bearing extremely unfavourable weather without injury. In all the preceding experiments some of the new varieties inherited the character of the male, and others of the female parent in the greatest degree; and of some varieties of fruit (particularly the Golden Pippin) I obtained a better copy, by introducing the farina into the blossom of another apple, than by sowing their own seeds; I sent a new variety, (the Downton Pippin,) which was thus obtained from the farina of the Golden Pippin, to the Horticultural Society last year, but those specimens afforded but a very unfavourable sample of it; for the season, and the situation in which the fruit ripened, were very cold, and almost every leaf of the trees had been eaten off by insects. In a favourable season and situation it will, I believe, be found little, if at all, inferior to the Golden Pippin, when first taken from the tree; but it is a good deal earlier, and probably cannot be preserved so long.

I proceed to experiments on the grape; which, though less successful than those on the apple, in the production of good varieties, are not less favourable to the preceding conclusions. A vinery, in which fires are made during the winter, affords to the vine a climate similar to that which the southern parts of Siberia afford to the apple, or crab-tree; in it a similarly extensive variation of temperature takes place, and the sudden transition from great comparative cold to excessive heat is productive of the same rapid progress in the growth of the plant, and advancement of the fruit to maturity. My first attempt was to combine the hardness of the blossom of the Black Cluster, or Burgundy grape, with the large berry and early maturity of the true Sweet-water.*

* This grape is often confounded by gardeners, both with the White Chasselas and White Muscadine.

The seedling plants produced fruit in my vinery at three or four months old, and the fruit of some of them was very early; but the bunches were short and ill-formed, and the berries much smaller than those of the Sweetwater, and the blossoms did not set by any means so well as I had hoped.

Substituting the White Chasselas for the Sweet-water, I obtained several varieties, whose blossoms appear perfectly hardy, and capable of setting well in the open air; and the fruit of some of them is ripening a good deal earlier in the present year than that of either of the parent plants. The berries, however, are smaller than those of the Chasselas, and with less tender and delicate skins; and, though not without considerable merits for the desert, they are generally best calculated for the press; for the latter purpose, in a cold climate, I am confident that one or two of them possess very great excellence. I sent a bunch of one of those varieties to the Horticultural Society, in the last autumn, and I propose to send two or three others in the present year.

I have subsequently obtained plants from the White Chasselas and Sweet-water, whose appearance is much more promising; and the earliest variety of the grape I have ever yet seen, sprang from a seed of the Sweet-water, and the farina of the Red Frontignac. This is also a very fine grape, resembling the Frontignac in colour and form of the bunch; but I fear its blossoms will prove too tender to succeed in the open air in this country; a single bunch, consisting of a few berries, is, however, all that has yet existed of this kind. The present season also affords me two new varieties of the vine, with striped fruit, and variegated autumnal leaves, produced by the White Chasselas and the farina of the Aleppo Vine: one of these has ripened extremely early, and is, I think, a good grape. When perfectly ripe, I propose sending a bunch of it for the inspection of the Horticultural Society.

In all attempts to obtain new varieties of fruit, the propagator is at a loss to know what kinds are best calculated to answer his purpose; and therefore I have mentioned those varieties of the grape, from which I have propagated with the best prospect of success. My experiments are, however, still in their infancy; and I do not possess the means of making them on so large a scale, or in so perfect a manner as I wish; nevertheless, the facts of which

I am in possession leave no grounds of doubt in my mind, that varieties of the grape, capable of ripening perfectly in our climate, when trained to a south wall, and of other fruits, better calculated for our climate than those we now cultivate, may readily be obtained; but whether the mode of culture I have adopted and recommended be the most eligible, must be decided by future and more extensive practice.

I have made experiments similar to the preceding on the Peach; but I can say no more of the result of them, than that the plants possess the most perfect degree of health and luxuriance of growth, and that their leaves afford satisfactory evidence of the good quality of the future fruit. I am ignorant of the age at which plants of this species become capable of producing blossoms; but the rapid changes in the character of the leaves and growth of my plants, which are now in their third year, induce me to believe that they will be capable of producing fruit at three or four years old.

I shall finish my paper by stating a few conclusions, which I have been able to draw in the course of many years' close attention to the subject on which I write.

New varieties of every species of fruit will generally be better obtained by introducing the farina of one variety of fruit into the blossom of another, than by propagating from any single kind. When an experiment of this kind is made, between varieties of different size and character, the farina of the smaller kind should be introduced into the blossoms of the larger; for, under these circumstances, I have generally (but with some exceptions) observed a prevalence in fruit of the character of the female parent; probably owing to the following causes. The seedcoats are generated wholly by the female parent, and these regulate the bulk of the lobes and plantula; and I have observed, in raising new varieties of the peach, that when one stone contained two seeds, the plants these afforded were inferior to others. The largest seeds, obtained from the finest fruit, and from that which ripens most perfectly and most early, should always be selected. It is scarcely necessary to inform the experienced gardener, that it will be necessary to extract the stamina of the blossoms from which he proposes to propagate, some days before the farina begins to shed, when he proposes to generate

new varieties in the manner I have recommended. When young trees have sprung from the seed, a certain period must elapse before they become capable of bearing fruit, and this period, I believe, cannot be shortened by any means. Pruning and transplanting are both injurious; and no change in the character or merits of the future fruit can be effected, during this period, either by manure or culture. The young plants should be suffered to extend their branches in every direction, in which they do not injuriously interfere with each other; and the soil should just be sufficiently rich to promote a moderate degree of growth, without stimulating the plant to preternatural exertion, which always induces disease.† The periods which different kinds of fruit trees require to attain the age of puberty, admits of much variation. The Pear requires from twelve to eighteen years; the Apple, from five to twelve, or thirteen; the Plum and Cherry, four or five years, and the Vine, three or four; and the Raspberry, two years. The Strawberry, if its seeds be sown early, affords an abundant crop in the succeeding year. My garden at present contains several new and excellent varieties of this fruit, some of which I should be happy to send to the Horticultural Society, but the distance renders it impracticable.‡

On raising new and early varieties of the Potato (Solanum Tuberosum). By Thomas Andrew Knight, Esq. F.R.S. &c.

(From the Transactions of the Horticultural Society of London.)

The Potato contributes to afford food to so large a portion of the inhabitants of this country, that every improvement in its culture becomes an object of national importance; and thence I am induced

† The soil of an old garden is peculiarly destructive.

‡ The Hautboy Strawberry does not appear to propagate readily with the other varieties, and may possibly belong to an originally distinct species. I have, however, obtained several offspring from its farina; but they have all produced a feeble and abortive blossom. If Nature, in any instance, permits the existence of vegetable mules, (but this I am not inclined to believe,) these plants seem to be beings of that kind.

to hope that the following communication may not be unacceptable to the Horticultural Society.

Every person who has cultivated early varieties of this plant must have observed, that they never afford seeds, nor even blossoms, and that the only method of propagating them is by dividing their tuberous roots: and experience has sufficiently proved, that every variety, when it has been long propagated, loses gradually some of those good qualities which it possessed in the earlier stages of its existence. Dr. Hunter, in his *Georgical Essays*, I think has limited the duration of a variety, in a state of perfection, to about fourteen years: and, probably, taking varieties in the aggregate, and as the plant is generally cultivated, he is nearly accurate. A good new variety of an early potato is therefore considered a valuable acquisition by the person who has the good fortune to have raised it; and as an early variety, according to any mode of culture at present practised, can only be obtained by accident from seeds of late kinds, one is not very frequently produced: but by the method I have to communicate, seeds are readily obtained from the earliest and best varieties; and the seeds of these, in successive generations, may not improbably ultimately afford much earlier and better varieties than have yet existed.

I suspected the cause of the constant failure of the early potato to produce seeds to be the preternaturally early formation of the tuberous root; which draws off for its support that portion of the sap which, in other plants of the same species, affords nutriment to the blossoms and seeds: and experiment soon satisfied me that my conjectures were perfectly well founded.

I took several methods of placing the plants to grow in such a situation as enabled me readily to prevent the formation of tuberous roots; but the following appearing the best, it is unnecessary to trouble the Society with an account of any other.

Having fixed strong stakes in the ground, I raised the mould in a heap round the bases of them; and in contact with the stakes: on their South sides I planted the potatoes from which I wished to obtain seeds. When the young plants were about four inches high they were secured to the stakes with shreds and nails,